

Tiger salamander is a truly unique California native

It's hard to imagine a heat sensitive animal that can easily dry up and die from heat exposure living far from water in the grasslands of California. As we all know, the weather of the Tri-Valley and Central Valley of California is characterized by long periods of high temperatures, low humidity and periodic droughts followed by relatively brief, cold and wet winters.

Even with the prospect of desiccation, the California tiger salamander (*Ambystoma californiense*) has evolved to fill a niche occupied by no other salamander in California. The only way the California tiger salamander can persist in this

seemingly inhospitable habitat is to hide from the relentless heat in the mild underground climate of tunnels and dens of grassland mammals. Grassland mammals have a propensity to dig elaborate burrows for breeding and shelter. The California tiger salamander is not anatomically equipped to dig its own burrow so instead takes advantage of the hard work of others. Of particular importance to the California tiger salamander in Liver-

more and Site 300 is the California ground squirrel (*Spermophilus beecheyii*) and to a lesser extent Botta's pocket gopher (*Thomomys bottae*), two highly motivated burrow excavators.

December is an important month for California tiger salamanders because the wet season allows for nighttime above ground movement and a brief opportunity to see this highly secretive and specialized native Californian. Above ground movements are almost exclusively from burrows to breeding areas, which can be stock ponds or natural seasonal pools (i.e. vernal pools).

Breeding migrations or "hikes" can be up to a mile and take several days or weeks to complete. The male salamanders arrive first at the pond followed by the females in subsequent rain events. A courtship "frenzy" occurs and breeding follows with the females laying eggs singly or in small clusters (far left).



By Michael van Hattem



The California tiger salamander is thought to live a long life of about ten years. The eggs, left, take about 10-14 days to hatch. The larvae period, right, occurs over a 3-6 month period to eventually become an adult California tiger salamander, center.



Eggs take about 10-14 days to hatch depending on temperature. The larval period takes 3-6 months, where larvae rapidly develop and feed on a variety of invertebrates and small vertebrates, such as tadpoles. As the pond dries, California tiger salamander larvae absorb their feathery gills and develop lungs and some of their characteristic dark-spotted coloration.

The next step in the salamander's journey is mind-boggling because the formerly aquatic salamander is now faced with the reality of terrestrial existence. In the final days and weeks before the pond dries, larvae (now called meta-

morphs) emerge and disperse into the upland habitat in search of a burrow to call home. The first night away from water is critical because the next day brings temperatures that will be lethal to an exposed salamander. Take a moment and think about how challenging the life of the California tiger salamander is. If the metamorph makes it to a burrow and survives, it may be 4-6 years before it returns to breed as an adult.

The California tiger salamander is a long-lived animal, probably in excess of 10 years, but like many declining species, each adult produces very few offspring. A number of factors including habitat loss and fragmentation, non-native species introductions and mammal control programs (such as ground squirrel control efforts) have led to the California tiger salamander being classified as a Species of Special Concern and now proposed for listing as "Threatened" under the Federal Endangered Species Act. In May 2004, the future of the California tiger salamander may be decided as the U.S. Fish and Wildlife Service will



issue a ruling on whether this state endemic becomes protected under the act. Until then, take advantage of these early season nighttime rains and see if you can catch a glimpse of this unique representative of California's native biodiversity.

The California ground squirrel has long been considered a pest in California because of its impact on agriculture and its tenacity to dig, but ecologically it is a keystone species. A keystone species can be thought of as an animal that once removed from an ecosystem would result in profound changes in the structure and biodiversity of that system. In simpler terms, California ground squirrels build homes for salamanders and frogs and are grassland Twinkies for eagles and badgers.



California ground squirrel